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AND

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THE PRODUCTIONS

OF THE

OTTAWA DISTRICT OF CANADA,

By EDWARD VAN CORTLAND, Esq.

AND AN ACCOUNT OF THE MANUFACTURE OF IRON,

DIRECT FROM THE ORE IN THE UNITED STATES;

WITH A

LETTER FROM HUNT'S MERCHANTS' MAGAZINE

ON

MINING IN ENGLAND AND THE UNITED STATES.

MONTREAL:
GEORGE SPARKES, BOOKSELLER, 16 GREAT ST. JAMES STREET.

1854.

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THE

PRODUCTIONS OF THE OTTAWA DISTRICT

OF

CANADA,

BY

EDWARD VAN CORTLAND, ESQ.

NATIVE IRON.

It is generally supposed that Iron never exists in the metallic state, but it is asserted that pure unadulterated Iron has been discovered at Canaan in the United States. Native Iron is likewise produced by the spontaneous ignition of Coal in the neighbourhood of Iron deposits, and where it is known under the name of Native Steel. The greatest quantity of Iron is found combined with Sulphur Oxygen or Carbonic Acid; the first known as Iron Pyrites, is never worked as an Ore. The best Iron Ores are Oxides, but the greatest proportion of British Iron Ore is a Carbonate.

MAGNETIC OXIDE OF IRON.

Oxydulous Iron, Octahedral Iron.

It is this variety of Iron Ore which produces the Native Loadstone. It occurs in various parts of the world, especially in the North of Europe, and is that of which the best Swedish Iron is made, and it yields also the Wootz Steel of the East Indies. It is of an Iron black colour, darker than common Iron; its powder is pure black—it exerts a decided action on the Magnetic Needle, attracting and repelling, according as the positive or negative points are represented. This variety, which is found in several parts of this continent is called, Native Loadstone. It is infusible before the blow-pipe, and soluble in Nitric Acid; it occurs in primitive

rocks, chiefly of mica and gneiss; it is exceedingly rich in metal, yielding 70 to 75 per cent. It is very abundant in Sweden, and at Gallivara, beyond the Polar Circle, it constitutes an entire mountain. In the United States it exists in the greatest abundance, and is worked in several places. On the western side of Lake Champlain, it is found in beds of 20 feet thick. Its ore produces the best steel, and on this account it is that English weapons of superior description are always made of Swedish Iron.

This ore exists in inexhaustible quantities in various parts of the Valley of the Ottawa.—The specimen before us was obtained from Lot No. 11, 7th concession of Hull, and only four miles from the falls of the Chaudiere, where it constitutes a bed of 20 feet in thickness, and there is a water power within 300 yards of it.

On the authority of Mr. Murray, the assistant Provincial Geologist, we are enabled to state that a remarkable mass of magnetic Iron ore exists on the 24th Lot of the 6th concession of South Crosby, on an Island in Mud Lake, not far from Newborough, on the Rideau Canal; it has a breadth of ore of considerable purity of seventy yards. "The great supply of ore," says this gentleman, "that might be here obtained, the proximity of wood in abundance for fuel, and the existence of water power at no great distance, combined with the advantage of a navigable canal, the water of which is within a few yards of the ore, render the locality well worthy of attention to such as are disposed to attempt the smelting of Iron in the Province."

The Geological formation yielding the magnetic oxides of Canada and those of the United States (where they prevail in equal abundance) are identical, says Mr. Logan, and it is probable they are both of the same formation as that of the Swedish mines. But the practical experiments on Canadian ores are still so few that nothing can yet be proved from them.

SPECULAR IRON ORE, RED IRON ORE, IRON GLANCE.

The lustre of this ore of Iron is metallic, its colour a dark steel gray, it is infusible before the blow-pipe, but melts with Borax. The great locality of this ore is the Island of Elba, which has been noted for producing it for sixteen centuries back, and its mines are considered inexhaustible;

but it is also found in Saxony, Bohemia, Sweden, Siberia, Massachusetts in the United States, in England, and lastly but not least, in the Township of McNab on the Ottawa River.—Wherever it exists, it is explored with profit. It is found at Ticonderago, where it is pulverized and used as a polishing powder. Most of the iron wire of England is manufactured from this ore. It is extensively used in the button trade as a polisher, and the ore most in demand for this purpose comes from Spain. The best specimens for button polishing command a very high price, and are generally obtained from small pebbles;—it is worked at Utica in the United States with profit. This ore exists in enormous quantities at the mouth of the Madawaska in McNab Township; it is a very valuable species and is very easily smelted, and possesses every requisite for that purpose on the spot. A splendid specimen of this ore was presented to the Bytown Mechanics' Institute at the time of our Exhibition, and attracted the marked attention of the Governor General. The ore bed is twelve feet in thickness, and will yield 25 tons of pure iron for every fathom in length and depth. The ore contains 59 per cent of pure metal.

BOG IRON ORE.

Hydrated Peroxide of Iron, or Brown Iron Ore.

This Ore is generally found in detached portions at the bottom of the shallow lakes and morasses, and hence its name—Bog Iron, and possesses several characters in common with Specular Iron Ore. It is made up of numerous aggregated fibres, and in colour it is invariably some shade of brown; it is very brittle, and possesses no magnetic power. On some occasions we meet with it in a more or less pulverized condition and assuming the appearance of an ochre, but it differs from all the other Ores of Iron, in containing water in large quantities, not simply absorbed, but constituting a characteristic part of the Ore, being chemically combined with it in the proportion of one-sixth.

Bog Iron Ore is only found in limited quantities in England, France, and Siberia. It is uncommon in the northern countries of Europe, but in Germany, France, and Austria it is extensively worked. At Salisbury in Connecticut, it exists to an unlimited extent, and has been worked for more than one hundred years, yielding from this locality alone the large quantity of two thousand tons of Iron annually.

The Iron obtained from Bog Ore is said to excel in toughness and hardness, and to be preferable to Red Iron Ore on that account, whilst the purer varieties, on being melted with charcoal, may be readily converted into steel of an excellent quality.

Bog Iron Ore is of more recent origin than any of the other Ores of Iron, and its deposition is going on continually, even at the present time in shallow lakes and swamps. In the south-western parts of New Jersey, where Bog Iron Ore occurs in great abundance, many spots previously exhausted are explored again successfully, after the lapse of about twenty years. And what is more curious than all we have yet said of it is, that it is brought to the state we find it in through the intervention of an infusorial animal called the *Gaillonella ferruginæ*.

In Sweden, Bog Ore has been fished up from the bottom of the sea, where, according to Hausmann, it is still produced. It is worked in every quarter of the globe, but its Ore is generally used for castings, which are said to take a sharper impression from the phosphoric acid, which Bog Iron Ore always contains. The Iron produced at the St. Maurice forges at Three Rivers, is obtained entirely from Bog Iron Ore, and is, as is well known, of an excellent quality. These forges were commenced by the French Government in 1737, and it is said most of the French cannon handed to the British at the capitulation were made there.

During the last American war these forges were of signal service to the British Army, having manufactured a large number of cannon balls and shells, at a time they were much needed.

It exists on the Ottawa on an eight feet bed at Cote St. Charles, on Lots 16 and 17, the property of Mr. R. Lancaster, who kindly forwarded these specimens to the Exhibition. Bog Iron Ore is known to exist in the Township of McNab, and other localities in the Valley of the Ottawa, but which as yet have not been explored.

"To metallurgists the good quality of the wrought Iron of the St. Maurice forges (says Mr. Logan) appeared the more deserving of attention, as the ore from which it is derived, being the Hydrated Peroxide, is usually accompanied by a small amount of Phosphorus, in the form of Phosphate of Iron. It is difficult to remove this impurity which in too large a quantity renders the metal cold short. In cast Iron,

however, its presence in small quantities cannot be called prejudicial, as it serves to render the metal very fluid when fused, and thus to give a fine surface to the castings, and bring out all the details of ornamental patterns in sharp relief, whilst it does not seem to render the casting brittle or to deteriorate its power of resisting the effect of sudden heating and cooling. This Peroxide of McNab, contributed to the Exhibition in London by Mr. Sheriff Dickson, of Pakenham, was regarded as a very beautiful ore, the uniform quality of which would render it one of much more easy fusion and management than the magnetic oxides, while it would probably produce an iron of excellent quality."

Mr. Logan referring to the Iron Ores of Canada, as they appeared at the Great Exhibition, remarks, "The vast supplies of Iron with which the collection gave evidence that the Colony is enriched, appeared to arrest the attention of all. The British Miner accustomed to follow into the bowels of the earth, beds of ore of six inches to one foot, containing between 30 and 40 per cent, of this important metal, naturally regarded with surprise, huge blocks of it from beds of 100 and 200 feet in thickness, and yielding 60 to 70 per cent;" and again, "the Canadian Iron Ores were examined with great care and attention, by the agents of Russia; it seemed to strike them with wonder that such prodigious sources should be found in any country but their own, and the public in general, without taking into consideration the question of its present application to profitable uses, seemed to regard the great beds of Magnetic Oxide, as a national Magazine, in which was stored up a vast amount of material indispensable to the comfort and progress of mankind, which it is always satisfactory to the inhabitants of a country to know is within their reach and control, should circumstances arise to render its application expedient or necessary.

PLUMBAGO.

Graphite, commonly called Blacklead.

Plumbago is found in various parts of the world, in detached rounded lumps, and in veins of mica slate, gneiss, and in transition rocks; and although called Blacklead, there is not one atom of lead in its composition, it being a carburet of iron. It is found of the best quality in a moun-

tain called Borrowdale, in Cumberland. The mine has been worked since the days of Queen Elizabeth, and is now nearly exhausted, the consequence of which is, that the Cumberland blacklead brings a very high price.

Plumbago also exists in many other parts of the world, where, although not of a quality fit for lead pencils, it is profitably worked for other purposes,—chiefly for converting into crucibles. It is used, however, for polishing grates and stoves, to prevent the friction of machinery, and as a preservative of iron from rust. On the Ottawa it is known to exist of a very pure quality at the iron mine in Hull, but as yet in such small quantities as not to warrant its being worked. It exists also tolerably pure at Devil's Lake, near Newborough, on the Rideau Canal. It is also found in large quantities, but of an inferior description, at Grenville, yet if properly cleared would no doubt answer for crucibles.

The opinion of some of the great pencil-makers of the metropolis was obtained by Mr. Logan, in regard to its applicability to the purposes of their trade, and "although it was found that the plumbago could by washing be freed from its impurities, and by pressure after the method of Mr. Brockedon be converted into pencils, they would be considered of inferior quality."

LEAD ORE—GALENA.

Lead was well known to the ancients, and was used in Britain from very early times. Amongst the Romans it constituted a most important article of commerce, blocks and pigs of it having been frequently discovered bearing Latin inscriptions, and the remains of Roman establishments are found in the neighborhood. Several pigs of lead are deposited in the British Museum bearing Roman inscriptions.

Lead ore is found in several parts of Canada. It either is or has been worked near Kingston, with what results I do not know. It abounds on the Ottawa, and somewhere in our immediate vicinity on the Gatineau, it is said to be so plentiful and so easy of access as, if discovered, to admit of being worked most profitably. But the secret of its locality is confined to the Indians, who look upon it with so much superstition that nothing can bribe them to divulge it; they are under the impression that when the white man dis-

covers it their race is to be swept away. I have in my private collection an Indian pipe made from an oaken knot, the bowl of which is most ingeniously lined with lead; it was found in an Indian grave at Rice Lake. It is found also in large quantities on the land of Mr. Marshall at Fitzroy, and ere long, I have no doubt, the Ottawa, amongst its existing and prospective manufactures, will add lead to the number.

COPPER.

Native copper, and the grey and yellow sulphurets, are as yet only known to exist in Canada, in quantities worthy of attention, upon Lakes Superior and Huron, where a company is just now working them very profitably; they are of a very pure description. We have a spear-head in the museum, Bytown, evidently made of native copper, and shaped by hammering, which was picked up in Renfrew. It is probable that it was left there by some of the migratory tribes of Indians during their incursions across the country on their way to the Ottawa, with a belligerent intention.

There is an engraving of a spear-head in the *Canadian Journal* for January, 1853, identical in every respect with our specimen, and which is described as a relic of the ancient miners of Lake Superior. It at all events shows us that the aborigines were acquainted with the metal.

Having now concluded our description of the metals, we hasten to enumerate some of the refractory materials and minerals of the Ottawa, amongst which are included,—

Marbles, white, mottled green, gray, brown, and of superior quality, and easily worked; Millstones, Grindstones, and Whetstones; Sandstone, white and yellow, for the manufacture of glass; Phosphate of Lime and Shell Marl, highly important as manures; Hydraulic Limestone, for making hydraulic cement.

Dolomite, for the manufacture of epsom salts, and containing 45 per cent. of carbonate of magnesia.

Steatite, or soap-stone, which is applicable to various purposes, since it is used in the manufacture of porcelain, and for polishing serpentine marble and mirror glasses. It constitutes the basis of cosmetic powders, and is a main ingredient in antiattrition pastes, and dusted on the inside of new boots, it causes them to slip on easily; lastly, it removes grease spots from silk and woollen cloths.

Amongst the minerals in the ladies' department, and applicable to jewellery, we have Labradorite, which, when looked at in different lights, assumes the hues of changeable silk. Sunstone Hyacinths and Oriental Rubies and Sapphires, together with Amethyst, Garnet, and Peristorite, a new mineral discovered by my esteemed friend, Doctor Wilson, of Perth, and deriving its name from the appearance it assumes of the beautiful color of a dove's breast.

CLAY FOR BRICKS, TILES, &c.

Pottery clay of several varieties also exists very generally throughout the Ottawa country.

OF THE WOODS OF THE OTTAWA.

EVERGREEN TREES — PINES.

RED PINE.

Pinus Resinosa, Pin Rouge.

Is a large handsome tree, with scaly red bark. Its timber enters largely into commerce, and is fine grained, and of close texture. It is shipped in the form of squared logs, and as well undressed as spars for masts and yards, for which purposes it is in great request; some deals are also manufactured from this wood. From its superior strength, it is used for rafters in England, and is well adapted for supporting the slate and tile roofs of Britain; and owing to the great distance lumberers have to go in search of it, it brings the highest price in the market. By far the largest quantity of red pine is derived from the Ottawa; and on the banks of some of our tributaries, large tracts of sandy land are entirely covered with it It constitutes the only open wooded tree in Canada.

WHITE PINE.

Pinus Strobus, Pin Blanc

This is the commonest and most majestic of all our pines, —towers over all the other trees of our forest, and attains a very great size. When growing in open situations, it is often feathered down to the ground, and when loaded with its large pendulous cones, assumes a very beautiful and picturesque appearance. White pine is easily wrought, comparatively free from knots, and very durable. Its timber is most in demand for ordinary domestic purposes, a fact fully demonstrated by the tens of thousands of logs we see everywhere about our sawmills. From its superior size and lightness, the lower masts of ships are generally made of it; and its possessing the property of not splitting by the sun, fits it for their decks. This wood is our most extensive article of commerce, and is shipped in the shape of masts, planks, boards, shingles, laths, and squared logs. This is one of the trees which furnish the gum with which the Indians pay over the seams of their canoes.

PITCH PINE.

Pinus Rigida.

Is the most symmetrical and beautiful of all the family of pines, although it seldom attains a great size, and never thrives except on the most arid and sandy soils. As its name indicates, it is chiefly employed for making pitch. It is an extremely rapid growing tree, and exists in large quantities at Sandy Point, Torbolton; and although every tree on this locality was destroyed by fire about ten years since, they have been reproduced in numbers, and of sizes already, which, but for the indisputable evidence of the neighboring farmers, could scarcely be believed. Tar and lampblack are largely manufactured from this tree, in Vermont, by a very simple process. The knots being incorruptible, are found abundantly in groves of this pine, which are collected and piled upon a stone hearth, covered with sods and earth, and set on fire; the heat soon expels the tar, which runs down a groove cut in the stone for that purpose. The lampblack is only the condensed smoke of the same fire collected in large wooden troughs. The only purpose this wood is converted to when worked, is pump-making.

SPRUCES.

Hemlock Spruce, Abies Canadensis, Pruche.

This tree is exceedingly abundant throughout Canada. It is a noble species, rising to 80 or 100 feet, and measuring often from two to three feet in diameter. It is of slow growth, and is supposed to require 200 years to attain its full size. When from 25 to 30 years old, its appearance is exceedingly elegant, but when older, its large broken limbs detract from its symmetry and beauty, and the naked stumps of the old limbs give the tree an appearance of decrepitude and decay. The wood is not of great value, and is chiefly employed for lathes and coarse in-door work. The bark is very valuable as a substitute for oak bark in tanning, and is that almost exclusively employed in our tanneries. A decoction of its bark is used as a sudorfic, whilst a fomentation made by boiling its branches, is considered by Shantymen to be a panacea for rheumatism and all sorts of swellings.

BLACK SPRUCE.

Abies Nigra, Epinette Noir.

Is a native of the most inclement portions of our continent, growing most densely, and presenting a very sombre appearance; and as large tracts of country are frequently covered exclusively with this tree, it has gained for them the appellation of Black Wood Lands. It is remarkable for the regularity and symmetry of its branches, which taper in the most beautiful pyramidal manner from the base to the summit. The timber is of great value, and is used from its straightness, lightness, and elasticity, for the yards of ships; and to "bend like a black spruce topmast" is a common saying amongst sailors. It is also used for the knees of ships and other craft. From it is extracted the Essence of Spruce, so well known for its antiscorbutic properties, and so largely employed in the manufacture of Spruce Beer. Large quantities of this timber are annually shipped off from Quebec, chiefly for the Irish market.

BALSAM SPRUCE.

Silver Fir, Abies Balsimea, Sapin.

This is a beautiful evergreen tree, rising in a pyramidal shape from thirty to forty feet. In open and cultivated grounds it becomes feathered down to the bottom; it is, consequently, much in demand as an ornamental tree. It is this tree which furnishes the Gum de Sapin, or Canadian Balsam, sold largely as a substitute for, and under the name of, Balm of Gilead, an article of Eastern production and which brings a high price in the market. It is also the chief ingredient in several descriptions of varnish, and particularly valuable for preparing a transparent limpid varnish for water color paintings.

It is the branches and leaves of this tree which furnish the lumberer with a rude and primitive bed, when far removed from the abodes of man, hunting up timber-groves in the forest.

RED CEDAR.

Juniper Virginianas, Cedar Rouge.

The Canadian red cedar is identical with the Bermuda cedar, which is so largely employed by the pencil-makers It grows from Cedar Island, Lake Champlain, to as far south as the Gulf of Mexico. It attains a height of about

sixty feet, grows on the most sterile regions, and may frequently be seen springing out of the crevices of rocks, growing most luxuriantly without any apparent nourishment. In this section of the country it is not applied to any particular use; but in the western district is largely used for fence rails. There is a peculiarity connected with this tree, which, although very ornamental, never produces two specimens alike,—that is, two trees of the same shape. A resinous gum, called Gum Sandarach, is obtained from the red cedar, which, when pulverized, is known under the name of Pounce, and is used as an absorbent of ink, and to prevent its spreading over the newly erased surface of paper; it is also largely employed by cabinet-makers for making a superior transparent varnish. The essential oil is very fragrant, and imparts a most agreeable odor to leather, and to it, books bound in Russia owe their inviting smell.

WHITE CEDAR.

Thuya Occidentalis, Cedre Blanc, Arbor Vita.

The white cedar never attains any great height, and is so universally known as the occupant of cedar swamps, that any lengthened description is uncalled for. The wood is soft, smooth, extremely light, and possesses an aromatic smell. It retains a permanent shape, and is so extremely durable as to have led to the saying, "As sound as a cedar-post." It is chiefly used for fences and the sleepers of cellars, and from it the Indian shapes the ribs of his frail bark.

EXTRACTS

FROM

THE AMERICAN MINING MAGAZINE,

REGARDING

THE MANUFACTURE OF BAR IRON.

The application of what is called Hilton's patent process for the manufacture of wrought-iron directly from the ore, with wood or mineral coal, at a single heat, has been undertaken in earnest by Messrs. Davis & Co., of Cincinnati.

They have put up a furnace, forge, and rolling mill in one building. The furnace and puddling oven are connected, when the ore is melted it flows into the oven, and by tapping a few inches above the oven hearth, the slag or drop flows out. The iron is balled and put under the trip hammer, made into blooms and prepared for the rollers: all done but with a small quantity of fuel. Owing to low water in the Ohio, Messrs. Davis & Co. have so far used a very inferior quality of black sandstone ore, yielding only about 15 per cent. of iron, and usually refused by foundry men as unprofitable.

The ore is pulverized and mixed with 20 per cent. of carbon—common bituminous coal—and then put into air chambers prepared for it, which are also heated by stone coal. In the puddling oven it is also heated by stone coal to a white or welding heat, and made ready for bailing. No charcoal or anthracite, heretofore considered as essential, is used. Nine blooms, of 70 lbs. each, averaging one in 15 minutes, required but three bushels of stone coal to the bloom. They are now turning out about 2½ tons of the best quality of blooms every 24 hours, at a cost of $12.50 per ton in Cincinnati.

The iron manufactured by the new process has been subjected to the severest test, such as making into horse-shoe nails, nuts, &c., and proves to be of as good quality as the best of blooms brought to the Cincinnati market.

The greatest advantages claimed in this process are the cheapness with which the iron is made, the cost estimated is but $22 to $23, where the ore and coal is near at hand—the use exclusively of the common bituminous coal—and the uniform good quality of the iron.

MANUFACTURE OF WROUGHT-IRON DIRECT FROM THE ORE.

A brief report was made in the last number of the ***Mining Magazine*** respecting the establishment of Messrs. Davis of Cincinnati, for the manufacture of wrought iron direct from the ore. The process adopted is that of James Renton, of Newark, New Jersey. The ore is taken in its raw state, and after being stamped, and prepared by an admixture of carbon, it is put in a series of close tubes, placed in a chamber, the outer surface of the tubes being exposed to the waste heat of the furnace for several hours, when it is sufficiently deoxydized. It is then discharged, as required, into the furnace, where it is readily worked up into balls weighing about one hundred pounds, and taken to the hammer, averaging two balls every hour. The process is continuous and uniform.

A company with a large capital has been successfully carrying on this process at Newark for a considerable time. Their iron has been introduced for manufactures, and with high commendation. We have seen their works in operation.

The cheapness of the process is worthy of attention. The following is a statement of the cost of a ton of blooms at Newark, with one furnace:—

From two to two and a half tons of ore, at $4,	$10 00
One and a half tons of coal, at $4 25,	6 38
Puddling and welding, per ton,	5 00
Hammering, "	1 50
Labor, "	3 00
Coal for carbon,	1 25
Half ton of coal for engine, at $4,	2 00
Making the cost of a ton of blooms about	$29 63

Any description of fuel—wood or coal, both anthracite and bituminous, can be employed for heating the furnace, and with nearly equal advantage.

MANUFACTURE OF IRON FROM LAKE SUPERIOR ORES.

The Lake Superior Iron Ores are the same as those found in the Ottawa District of Canada.

The Lake Superior iron ores belong to the variety of ores known as ***specular iron***—a combination of iron and oxygen, of which the metallic proportion ***cannot*** exceed by weight seventy-two and a small fraction per centum. ***Magnetic iron ore*** accompanies the specular, and the two are frequently mixed. The greatest proportion of iron ever obtained from this mixture cannot exceed seventy-five per centum. No reliable analysis of the Lake Superior ore has ever given so high a yield as this. Statements of a greater yield prove their own falsity, and the ignorance of the operator. Such ores are ***not peculiar*** to the Lake Superior region. They are almost or quite as abundant in Missouri; and similar ores are extensively worked on the shores of Lake Champlain, in Orange co., New-York, and in New Jersey, New Hampshire and Georgia, contain in mountain masses varieties little differing from them. Some of the Andover ore of New Jersey cannot be distinguished from the choicest of the Lake Superior ores; and if made into bar iron direct, with the same care as were the samples for trial prepared from this ore, there is no question but it would exhibit the same remarkable strength; the pig-iron manufactured from it, though made with anthracite, possesses the strength of the best charcoal iron.

Being very free from earthy matters, these ores are well adapted for working in bloomery fires. They require a preparatory roasting, stamping and screening, by which they are subjected to some loss, and finally yield about a ton of metallic iron to two of ore as taken from the mine. More or less is lost in the cinder, according to the skill of the workmen, the purity of the ores and the adaptedness of the apparatus.

The bloomery process is a convenient one, where the ores are of this rich character, and charcoal is abundant. The charcoal made from the hard maple and birch of this region, is especially well adapted for this process. It is of remarkable soundness and density, owing to the great hardness of the wood. The same cause adds materially, however, to its cost. Each bloomery fire, worked by two bloomers and

two ordinary workmen, turns out about a ton of blooms in twenty-four hours. The wages amount to eight dollars, and the consumption of coal, including waste, and all really *paid for*, can seldom be estimated at much less than 300 bushels. Of the charcoal, such as I saw at the works, 250 bushels ought to be enough. The expenses of manufacture may then be estimated as follows :—

Estimated cost of a ton of blooms made on the Lake Shore.

2 tons of ore, quarrying and hauling 12 miles, at $2	$4 00
Roasting same, at $1	2 00
Stamping and screening, at 50c.	1 00
250 bush. Charcoal, at 8c. (actual cost)	20 00
2 bloomers at $3, 2 helpers at $1, or same amount as by actual contract	8 00
Repairs $1, Superintendence $1, Interest $1	3 00
General expenses	2 00
Cost on Lake Shore	$40 00
Shipping, freight, carting, storage and commission, say	15 00
Cost when sold at Cleveland	$55 00

Estimated cost of making Charcoal Pig Iron at Detroit, in large blast furnaces, railroad to the mines, and canal built.

1¾ tons of ore at $4	$7 00
130 bush. charcoal at 4c.	5 20
Flux 50c., labor $2	2 50
Repairs 50c., superintendence 50c.	1 00
Interest, general expenses	1 00
	$16 70

On the Island of Elba are found large bodies of ore similar to those of Lake Superior. The furnaces for smelting them are on the opposite shore of Tuscany. They are small, and of very peculiar construction, different from any other furnaces, but by their extraordinary yield they have proved to be extremely well adapted for smelting this kind of ore.

THE FOREST CITY IRON WORKS.

The Forest City Iron Works, controlled chiefly by Messrs. Hayes, Moore, McLelland, Renton, and others, will immediately commence the erection of their works on the Lake shore, about one mile east of the dock in Cleveland. They have secured eight acres of ground, a space ample for the most extensive operations, upon which they will commence during the present week, a large smelting and refining works and rolling mill, the former to employ twelve of James Renton's improved ore-welding furnaces, capable of

turning out upwards of 500 tons of blooms per month. The furnaces and other improvements employed, will, it is anticipated, effect a large saving in the cost of manufacture over that by the ordinary process. It is believed that bar iron can be produced at a cost of $28 per ton, allowing $8 for mining and shipping ore to Cleveland, $10 for working into blooms, and $10 for conversion into the marketable article. This cost has been estimated, with the use of the improved furnaces, as low as $22 a ton, but $28 is believed to be a liberal allowance, capable of covering all contingencies. The raw ores will be furnished under a contract with parties owning ore lands in the Lake region. The ores secured by this contract are expected to yield 70 per cent. of iron, and it is this degree of purity, and consequently small amount of waste, that will allow of shipping these ores with profit, in their raw state, from Lake Superior to Cleveland, and thereby dispensing with the necessity of investments at the Lake The location of these ores is on Carp River. The coal used at the Cleveland works will be a bituminous coal, dug upon the line of the Cleveland and Pittsburgh Railroad, 69 miles from Cleveland, and will be delivered in Cleveland at a cost of $1.70 per ton.

This iron, which can be placed on board of any of the cars running out of Cleveland, for less than $30 per ton, would be superior for engines, boilers, rails, job work, and other purposes, to the iron for which 5¼ cents per pound is now paid. The *blooms* made from Lake Superior ore, which Mr. Hayes of Cleveland estimates can be made for $28 a ton, have been sold already in Cleveland for $65 a ton, in lots of 100 tons, and have received offers in Pittsburgh of $75 a ton. These were just as they were delivered from the Lake, where, from the imperfect character of the works, the ore was not thoroughly worked, and was not as valuable as it will be made when the contemplated improvements are completed. Already has Eastern capital been attracted here; but in view of the immense advantages likely to result from its investment, we may say that not the *one hundredth part* which should be sent here has been yet subscribed or expended for works of this character.

MINING IN ENGLAND AND THE UNITED STATES.

Freeman Hunt, Editor of the Merchants' Magazine, &c.

Sir,—The magnitude of the mining interest of England is but little understood in this country; but few of our com-

mercial and moneyed men are aware of the vast aggregate of capital invested in the mines of Great Britain, the high respectability of the parties connected with the enterprises, the high position which a majority of the companies occupy in the opinion of moneyed men, or its great influence upon the commerce of that country.

The minds and purses of our enterprising capitalists seem to be absorbed in the one idea, that railroad bonds and stocks are about the only things fit to invest their surplus funds in. and this, too, in the face of the host of railroad stocks and bonds now selling for much below their original cost. Let them but turn their attention to the mines of England, and contrast their aggregate profits and yearly dividends with the bulk of our railroad shares, and we think there would then be some hope of attracting a portion of their surplus means to legitimate mining in this country.

The mines of England constitute one of its chief sources of wealth and prosperity. They not only supply the commerce and manufactories of Great Britain, but levy a tribute to the tune of many millions of dollars annually upon the United States for metals which we ought to produce within our own borders.

The English mines pay a larger profit on the amount invested than any other kind of business. The aggregate of profit annually paid to the stockholders is so large as to strike the reader of their reports with surprise ; and perhaps the reader of this will be a little doubtful when I inform him that many of the English mines divide from 100 to 300 per cent. profits annually, and yet the actual facts, as presented in the London *Mining Journal*, will fully corroborate this assertion. When we take into consideration the small per centage of their ores as compared with the great richness of a majority of our own mines, the rich result of their operations seems the more surprising. The average per centage of metal to the copper ore of Great Britain, as proved by their monthly ticketings or sales, is from $6\frac{3}{4}$ to $7\frac{1}{2}$, while in this country the average, as far as can be ascertained, is more than double that amount. The same fact holds good with regard to our lead and zinc mines, and while the ores of our own mines are generally richer, they are at the same time obtained much nearer the surface than theirs, and consequently at less cost. With all these things in our favor, it seems remarkable that so little attention is paid to this

highly important interest by our capitalists and men of neterprise.

Mining in the United States has but just commenced, and yet it has made rapid strides toward development; and the few mines in which capital has been judiciously employed to any extent, and the veins properly and scientifically worked, show a result which the enterprising gentlemen engaged in them may well be proud of. The mines of Lake Superior are now the most successful we have in the country, and mining in that region has been carried on under numerous obstacles of quite a serious nature, and for a long time it was doubtful and discouraging, but by perseverance, energy, and well-expended capital, they are now on the highway to success, and have already begun to reap a rich harvest of dividends. The Boston and Pittsburgh Company, (Cliff Mine), is thus far the most successful, and with an outlay of $18 per share, has, in a little more than four years, paid back $51.50 per share in dividends, and has a surplus of nearly $100,000 in their treasury, and will probably pay a dividend of $25 this year. The mine is opened to a depth of 680 feet. The Minnesota and Copper Falls Companies are in a very promising condition, and are nearly ready to pay handsome dividends. There are thirty promising mines in this region—all rich in copper.

There are lead and copper mines in New York, Massachusetts, Connecticut, Pennsylvania, Maryland, Virginia, and North Carolina, in active progress, that bid fair to yield a handsome remuneration to the shareholders.

The Lake Superior Mines are mostly owned by the Bostonians. The high estimate in which that interest is held, may be inferred from the prices paid for shares in some of the leading mines. The Cliff, with a par value of $18, is now in demand at $150 per share; the Minnesota, with a par value of $22, is in demand at $170 per share; and the Copper Falls, with a par value $8, is in demand at $50 per share. The success of these mines is bound to exert a powerful influence on the whole mining interest of the United States, for it establishes the following facts,—namely, that good mines may be taken hold of and carried to a successful issue by a proper application of capital and skill, and a moderate quantity of patience; that careful capitalists and shrewd business men may not be afraid to employ a portion of their surplus means in well-organized and well-managed mining Companies; that legitimate mining can be

made as respectable as any other branch of commerce; also, that men of high position and business respectability may in this country, as they *now do in England*, engage in mining, either as officers or private stockholders, without impeaching their integrity, or tainting their standing.

In England, mining has become one of the most popular modes of investment, and every new scheme finds abundant means and the best class of men for its management.

Our country is one vast bed of mineral wealth, yet in its whole extent there are but few paying mines, and those few are the only instances where capital has been judiciously expended, and skill properly applied, in developing the veins of ore. We do not know of a single instance in this country where a good mine, with a sufficiency of capital and properly-applied energy, has failed to be productive; and wherever good mines have failed and been abandoned it will be found that ignorance and want of energy were the causes of such result. It is a notable fact in England that some of their richest mines have been those which have been abandoned as unworkable by some previous company.

Metals are now higher in price than ever before known during this century, and mining never so remunerative as now.

The great increase in consumption of copper, lead, silver, zinc, and tin, has already called forth comment in the London *Times*, for it is feared the home supply will soon be inadequate to their own wants, and they are now casting their eyes towards the United States as the only country that can be counted on for an increase of the supply, even in sufficient quantities for the actual wants of the two countries. With this state of things to encourage us, it seems quite time to bestir ourselves and devote a part of our energies to internal development. There is not a State in the Union but might add a large annual increase to its wealth by properly applying a portion of their energies to the working of their mines, and I believe we all feel that we ought to supply our own wants from our own resources, without paying annually so many millions to foreign countries for that which is so abundant at home.

The English mines are worked at great depths, and in no other country in the world is mining carried to such a degree of skill and perfection; and small as their territory is, they have more active mines than the rest of the civilized

world, there being more than five hundred companies in full operation, beside the iron and coal companies. One would think that at this rate the whole country would soon be undermined, and leave no spot unexplored; yet every year they open new mines.

The following figures will illustrate, in a condensed form, the value of a few of the English mines:—

There are eighty-seven companies chiefly located in Cornwall, with an aggregate capital of only $6,961,960, or an average of only $80,000 each, the shares of which are now selling for $19,890,055, or at a premium of 285 70 per cent. Sixty-six of the companies have paid back the large amount of $19,436,450 in dividends.

RECAPITULATION.

Eighty-seven companies .	$6,961,960
Present value	19,890,055, or 285.70 prem.
Dividends by 66 companies .	19,436,450

What has been done in England *can* be done in this country.

With these few facts and figures, I will leave the subject for the present, trusting the matter discussed will prove attractive to some who have not before fastened their thoughts upon it. J. H. S.

INVESTMENTS IN MINES.

(*From the American Mining Magazine.*)

I am told it is usual to make estimates of the returns that mines will yield, and especially that these are necessary as inducements for the investment of capital. I am also told that disappointment frequently treads very closely on the heels of promise in many of these enterprises. Is it strange that it should be so? Have men any more right to expect success in mining, than they have in any other important business, without employing the proper means, guided by the requisite knowledge and experience? Is this the fault of the rich mineral deposits in which our country is known to abound? Or can any deny, that in every country where mining is legitimately followed, it is of more enduring profit than any other pursuit? If a merchant were to fill his store with worthless and unsaleable articles, bought without knowledge and without reference to value, would it be strange that he should do a losing business?—and would his failure be any reason why a prudent

man should not buy and sell merchandise? In a mining country, like Mexico for instance, where the little knowledge I have on this subject has been acquired during the past three years, and where the first feverish excitement always attending any new leading pursuit has long since subsided and passed away, the first expenditure in proving the character of a vein is always deemed a lottery, with more or less chances of success,—and with them it is the only lottery! Nor do they hesitate, when the character of the vein is known, to expend any required amount, however large, to put it in successful operation, and deem the time short if accomplished in three years! They are then paid for waiting, and have a property that may be transmitted from generation to generation. Nearly all the brilliant fortunes and great landed estates of the Republic are in the hands of descendants of mining families. The English, who are *Bully Miners*, expended two millions of dollars in restoring and putting in order the Bolono Mine, before they got any returns. There have been single years since that time, in which the bullion produced was equal to the money first expended. In restoring, clearing out, and repairing the outworks of the great La Luz Mine, after the revolution, $800,000 were expended before any returns. This mine, during the last six years, has produced many millions net profits. The Real Del Monte Mine gives to its proprietors at present nearly two hundred thousand dollars per month. It is indeed a sorry mine here or elsewhere, properly opened and worked, if it do not pay a good dividend on a capital of a million.

Why, then, is it that there are so many disappointments in the United States? The answer, unfortunately, is to be found in the undeniable fact that, in too many instances, the proper means have not been employed. A location is made, or a tract is purchased, having an out-cropping vein upon it; an excavation is made on the vein, for any thing under a hundred feet is, after all, but an excavation; a few fine specimens of ore are procured, and forthwith a company is formed. A ton or two of ore is hurried to the market and sold at auction, as mere samples of what is coming; the stock is thrown on the market, with an abundant supply of "fine prospects, promising lode, beautiful gossan;" all impatience, all hurry; new, ill-adapted, and untried machinery sent out; the stock rises in the market, it is quoted every day at the Board, and men, without much inquiry,

knowledge, or experience, buy—because it is so cheap; and the result is, that time passes along, and, as a matter of course, disappointment follows, and somebody finds a worthless piece of scrip in his portfolio, representing an interest in a mine, which, after all, had it been really properly opened, and properly worked, might have yielded very fair returns, if not a brilliant fortune for all concerned.

But all these, and even more, will not suppress, though it may for a time retard, the mining interests of the country. Experience will soon, if it has not already, set these matters right. There are good mines enough in the hands of good men, who have the means and the courage and the patience to work deep and strong. These have met, are meeting, and will meet with their reward. Others, that have started wrong, will have to stop, remodel, or give place to new parties, *i. e.*, where their veins are worth pursuing. Capital must have a better share. Originators must be content with less reserved interest or shares, and they will find it more satisfactory and profitable in the end. It does not take a large interest in a good mine to support a family.

And capitalists, who are not without fault, must have more patience. A company of business men unite for manufacturing purposes,—two, three, or five hundred thousand dollars are invested in steam or water-power buildings and in the erection of machinery, and then fifty or sixty thousand dollars are added for working capital, and after two or three years they are quite content to be in the receipt of ten or twelve per cent. per annum. So in the construction of a railroad, mountains must be levelled and valleys filled up—or a coal mine is opened, and millions spent on roads to get it to market, before the ten or fifteen per cent. can be expected. And so with every other common sense pursuit of life. When capitalists have learned to apply this principle, even on a small scale, to mining matters, they will find which pays best. The experiment has been made elsewhere, and it is in process of being made here.

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